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An Update on the Clinical Utility of the Children's Posttraumatic Cognitions Inventory

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Abstract

The Children's Posttraumatic Cognitions Inventory (CPTCI) is a questionnaire that measures maladaptive cognitions following exposure to trauma. In this study, the CPTCI's discriminant validity, test-retest reliability, and the development of a short-form of the measure were investigated. Three samples of children (N = 535; 7 - 17 years) completed the CPTCI and a structured interview to measure PTSD symptoms between 1 and 6 months following trauma. Test-retest reliability was investigated in a subsample. The results showed a score in the range of 46 and 48 on the CPTCI was the best indicator of clinically significant appraisals, as determined by the presence of PTSD, and the measure had moderate to high test-retest reliability (r = .78, p < .001). The Children's Posttraumatic Cognitions Inventory – Short Form (CPTCI-S) had excellent internal consistency (α = .92), moderate to high test-retest reliability (r = .78, p < .001), and the model had an excellent fitting factor structure (CFI = 0.95; TLI = 0.91, RMSEA = .072). A score in the range of 16 and 18 was the best cut-off indicative of clinically significant appraisals. On this basis, we conclude the CPTCI and CPTCI-S are useful measures to support the clinical practice of clinicians.

An Update on the Clinical Utility of the Children's Posttraumatic Cognitions Inventory

Over the past 20 years the body of research on the cognitive factors placing children and young people at risk of posttraumatic stress disorder (PTSD) has proliferated (Dalgleish, Meiser-Stedman, & Smith, 2005; Meiser-Stedman, 2002; Salmon & Bryant, 2002). Maladaptive cognitions developing in the aftermath of trauma, for example, viewing the self as incompetent or the world as dangerous, are thought to be principal risk factors for the development of PTSD (Ehlers, Mayou, & Bryant, 2003; Stallard & Smith, 2007). One clinical trial suggested these cognitions are important treatment targets during cognitive therapy for PTSD in children and young people (Smith et al., 2007).

The inclusion of a Negative Mood and Cognitions cluster in the Diagnostic and Statistical Manual of Mental Health Disorders – 5th edition (DSM-5, 2013) was an important acknowledgement that maladaptive cognitions are central to the pathology of trauma responses. The Posttraumatic Cognitions Inventory (Foa, Ehlers, Clark, Tolin, & Orsillo, 1999) was the first comprehensive self-report questionnaire to measure trauma related cognitions. One study examined the structure of items from the scale using principal components analysis, producing three latent constructs subsequently termed (a) Negative Cognitions about the Self, (b) Negative Cognitions about the World, and (c) Self-Blame (Foa et al., 1999). The association of these three latent dimensions to levels of overall adjustment (i.e., the total frequency of PTSD symptoms) and to sub-clusters of PTSD has been previously tested in several studies (Beck et al., 2004; Moser, Hajcak, Simons, & Foa, 2007). Importantly, one treatment trial also found that a reduction in PTS symptoms over the course of Cognitive Behaviour Therapy (CBT) was partially mediated by a reduction in the severity of trauma related cognitions throughout treatment (Beck et al., 2004; Mueser et al., 2008).

An adaptation of the PTCI for children and young people, known as the Children's Post-Traumatic Cognitions Inventory (CPTCI; Meiser-Stedman, Dalgleish, Glucksman, Yule,

& Smith, 2009a; Meiser-Stedman, Dalgleish, Smith, Yule, & Glucksman, 2007; Meiser-Stedman et al., 2009b) followed. An analysis of the measure's psychometrics showed it had moderate test-retest reliability (r = .70) and internal consistency (α > .75) (Meiser-Stedman et al., 2009b). Unlike the adult version of the measure, a validation study found the factor structure of the measure was best represented by two constructs defined as Permanent And Disturbing Change and Fragile Person In A Scary World (Meiser-Stedman et al., 2009b). The relationship of maladaptive cognitions to PTSD has now been demonstrated in samples of school children (Meiser-Stedman et al., 2009b), injured children with Acute Stress Disorder (Ellis, Nixon, & Williamson, 2009; Nixon et al., 2010a; Salmon, Sinclair, & Bryant, 2007), injured children with PTSD (Meiser-Stedman et al., 2009b), and youth exposed to maltreatment (Leeson & Nixon, 2011).

In summary, maladaptive cognitions are thought to be a core aspect of PTSD in children and young people. The CPTCI is a promising questionnaire for measuring these processes and, as such, it would be helpful to examine the measure's psychometric properties in greater detail. This study had three aims: The first aim was to determine an appropriate cut-off for the CPTCI by establishing the measure's sensitivity to detect PTSD status. It is important to acknowledge that the terms specificity and sensitivity have strong connotations; we would like to make it clear that it was not our intention produce an optimal cut-off measure to screen for PTSD, but to highlight young people in the clinical range on their endorsement of problematic trauma-related cognitions, as determined by the presence of PTSD. The second aim was to show the CPTCI's test-retest reliability in a sample that was not a part of the initial validation study (Meiser-Stedman et al., 2009b). The third aim was to create a short-form of the CPTCI to facilitate the assessment of appraisals in clinical settings.

Method

Participants and Procedure

The initial sample comprised N = 535 (M_{age} = 12.96 years, *SD* = 3.02, 57.6% male) children and young people. However, a total of *n* = 43 participants did not have diagnostic data on the presence of PTSD and were excluded from the study.

The final sample comprised *N* = 492 (M_{age} = 12.98 years, *SD* = 2.99, 56.9 57.1% male) children and young people recruited from East Anglia (*N* = 242, M_{age} = 13.95 years, *SD* = 2.87), London (*N* = 133, M_{age} = 12.77, *SD* = 2.70) (Meiser-Stedman et al., 2007; Meiser-Stedman, Smith, Glucksman, Yule, & Dalgleish, 2008; Smith et al., 2007), and Australia (*N* =117, M_{age}= 11.79, *SD* = 2.87) (Nixon, Ellis, Nehmy, & Ball, 2010b; Nixon, Sterk, & Pearce, 2012).

All study subjects were interviewed between one and six months of experiencing a trauma. Children recruited into the study had experienced single incident stressors, for example, motor vehicle collisions and physical assaults, as opposed to repeated trauma (e.g., domestic violence). The majority of children in the sample had experienced a road traffic collision (RTCs; *N* = 221, 44.9%), followed by accidental injuries (*N*= 175, 35.6%), and then assaults (*N* = 96, 19.5%).

Each site had received ethics approval from the relevant local Institutional Review Board/Research Ethics Committee. Written, informed consent was obtained from all individual participants.

At all sites the upper age limit was 17 years. In London and East Anglia the lower age limit was 8 years whereas in Adelaide it was 7 years'. Recruitment rates (i.e., the proportion of families approached that completed the initial assessment) were 30.9% to 36.9% for London prospective studies, and then 29.5% and 33.4% respectively for prospective studies carried out in Australia and East Anglia. Details of recruitment flow for London (Meiser-Stedman et al., 2007; Meiser-Stedman et al., 2008; Smith et al., 2007) and Adelaide (Nixon et al., 2010b; Nixon et al., 2012) sites have been described in detail elsewhere. In East Anglia,

the exclusion criteria for cases recruited from Emergency Departments trauma exposed and clinical cases were as follows: intellectual disability; assaults where the assailant was the young person's caregiver or close relative; being unconscious for >15 minutes following the traumatic event; not being fluent in English; ongoing exposure to threat; history of organic brain damage; and significant risk of self-harm.

Measures

In London, interviews were carried out in the family home or a clinic and families typically brought their completed CPTCI (as part of a questionnaire package sent prior to the appointment) on the day of their appointment. In Australia, phone interviews were carried out for trauma exposed cases and trial referred cases completed their measures in the university clinic. In East Anglia, phone interviews were carried out for trauma exposed cases and clinic-referred cases were either assessed at home, a local GP surgery or at the clinic.

PTSD was measured according to the DSM-IV criteria (DSM-IV, 1994) using structured clinical interviews containing appropriate developmental adaptations for children and young people at all sites. The psychometric properties of these measures have been established in previous research (Nader, 2002; Saigh et al., 2000; Silverman & Albano, 1996). The Clinician-Administered PTSD Scale for Children and Adolescents (CAPS-CA; Nader, 2002) and the Children's Post-traumatic Stress Disorders Inventory (CPTSD-I; Saigh et al., 2000) were administered to children in Australia and East Anglia respectively. In London, for trauma-exposed cases, the PTSD module of the Anxiety Disorders Interview Schedule - Child Version (ADIS-C; Silverman & Albano, 1996) was administered. Clinic referred cases completed the CAPS-CA (Nader, 2002).

Data Analysis

All analyses were carried out in SPSS Version 22 unless otherwise stated. The distributions of CPTCI and PTSD scores were skewed, but as results were replicated using transformed and raw scores, the results are reported using the raw data.

The CPTCI's sensitivity and specificity to detect PTSD status was examined. Sensitivity indexes the proportion of people who are correctly identified by the measure as having a particular condition. Specificity indexes the proportion of people who are correctly identified by the measure as not having the condition. The CPTCI's screening properties were then evaluated further using Receiver Operator Characteristic (ROC) curves (Hanley & McNeil, 1982). A score of 1 indicates a perfect test, while a test result of .5 indicates screening abilities no better than what would be achieved by chance

Items for the CPTCI-S (see Table 1) were chosen after consideration of their factor loadings, and their correlations with the CPTCI total score and PTSD status. A confirmatory factor analysis (CFA) was carried out in EQS. The CFA analysis involved carrying out a Multiple Indicators Multiple Causes (MIMIC) model to evaluate the impact of site on factor structure. The data of clinic referred Adelaide cases was not included in the examination of the CPTCI-S as only subscale and total scores were available for these cases. One model was tested following the scale items of the CPTCI (Meiser-Stedman et al., 2009b). The factor model was fitted using robust methods as this method is best for handling correlated data with high levels of skew (Lee, Poon, & Bentler, 1995). Multiple fit indices evaluated model fit, including the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and the Root Mean Square Error of Estimation (RMSEA) (Bentler, 2007).

Results

There were 102 (20.7%) children and young people in the final sample who had a PTSD diagnosis. On the Fragile Person In A Scary World subscale, as expected, children with a PTSD diagnosis (M = 32.67, SD = 7.98) scored higher than children without PTSD (M = 19.81, SD =

7.16). Children with PTSD (M = 31.73, SD = 9.47) had higher scores on the Disturbing And Permanent Change scale than children without (M = 16.68, SD = 5.74). In the full sample, the point-biserial correlation of the CPTCI with PTSD diagnosis was significant (r = .58, p < .001). This indicated that although related to PTSD diagnoses, the short form score wasn't simply a proxy for PTSD as the correlation was < .80.

Table 2 presented the sensitivity and specificity coefficients of the CPTCI total score against PTSD diagnosis at varying cut-offs. Our data showed a cut-off score between 46 and 48 was the best indicator of clinically significant appraisals, as determined by the presence of PTSD. With these cut-offs, sensitivity coefficients ranged between .82 and .84, and specificity coefficients ranged between 80.8% and 83.6%. Additional ROC analyses suggested that at these cut-off points AUC's were good and ranged between 82.8% and 84.9

The test-retest reliability of the CPTCI (N = 203) over a 2-month period was r = .74 for the Fragile Person in a Scary World sub-scale, and r = .77 for the Disturbing and Permanent Change subscale, and r = .78 overall. Paired t-tests also showed that the Fragile Person in a Scary World subscale, $t(202) = -1.66$, p = .10, the Disturbing and Permanent Change sub-scale, $t(202) = -.28$, p = .78, and the Overall scale, $t(202) = -1.18$, p = .24, did not significantly change over this two month period.

CPTCI items to be included in the short-form were selected based on their item total correlations, correlations to PTSD status, and factor loadings (from a preliminary factor analysis). The item-total correlations of the CPTCI (full version) ranged from r = .59, p < .001 to r = .81, p < .001, and correlations to PTSD status ranged from r = .31, p < .001 to r = .62, p < .001. A preliminary confirmatory factor analysis (using the same analytic strategy as the CFA for the short form) on the full-form produced factor loadings that ranged between .53 and .81. The items included in the CPTCI-S performed strongly on all three criteria, and

had item-total correlations at or above $r = .72$, $p < .001$, correlations to PTSD status at or above $r = .49$, $p < .001$, and factor loadings at or above .77.

A variety of fit indices were used to evaluate the fit of the model tested in the CFA analysis. On the CFI and TLI, a value of 0.90 shows a good fit, and a value of 0.95 shows an excellent fit (Kline, 2005). RMSEA values of $\leq$ 0.05 are thought to indicate a close fit, 0.05 - 0.08 a fair fit, and 0.08 - 0.10 a marginal fit by one standard deviation (Browne & Cudeck, 1992). In a sample of this size, factor loadings of $\geq$ .30 are needed for that item to be considered to be of practical significance to the overall construct (Hair, Black, Babin, Anderson, & Tatham, 2006).

The CFA analysis of the two-factor model produced a significant result, $\chi^2(34) = 82.59$, $p < .001$. This model was an excellent fitting model for the data according to the CFI (0.95) and TLI (0.91), and a good fit of the data according to the RMSEA (.072; CI: 0.057, 0.086). The factor loadings of the CPCTI-S are presented in Table 1. Factor loadings ranged from .64 to .79, easily meeting the minimum .30 value required for practical significance in (Hair et al., 2006). The CPTCI-S had acceptable internal consistency for the Fragile Person in a Scary World subscale ($\alpha = .81$), for the Disturbing and Permanent Change subscale ($\alpha = .91$) dimensions and the full scale ($\alpha = .92$).

The test-retest reliability for Fragile Person in a Scary World ($r = .74$, $p < .001$) and Disturbing and Permanent Change ($r = .77$, $p < .001$) subscales was acceptable as was the total scale ($r = .78$, $p < .001$).Paired t-tests also showed that the Fragile Person in a Scary World sub-scale, $t(202) = .32$, $p = .75$, the Disturbing and Permanent Change sub-scale, $t(202) = .03$, $p = .98$, and the Overall scale, $t(202) = .20$, $p = .84$, of the short form did not significantly change over this two month period.The point-biserial correlation of the CPTCI-S with PTSD diagnosis was statistically significant ($r = .59$, $p < .001$). The sensitivity and specificity of the CPTCI-S against DSM-IV PTSD diagnosis was also strong (Table 3). The data indicate an appropriate cut-off score

in the range of 16 and 18 was indicative of clinically significant appraisals, as determined by the presence of PTSD. With these cut-offs, the sensitivity index ranged between .85 and .91, and specificity ranged between .83 and .88

Discussion

This study extended knowledge regarding the psychometric properties of the CPTCI by publishing a cut-off for elevated/clinically significant scores on the measure. We also replicated previous studies in showing the CPTCI has appropriate internal consistency and test-retest reliability. The CPTCI-S had excellent psychometric properties and slightly superior psychometrics to the CPTCI (Meiser-Stedman et al., 2009b).

Our findings replicated previous studies showing that maladaptive cognitions are strongly associated with PTSD (Leeson & Nixon, 2011; Meiser-Stedman et al., 2009a; Meiser-Stedman et al., 2009b; Salmon et al., 2007), consistent with theoretical accounts of PTSD (Ehlers & Clark, etc) and with the changes in the DSM-5 to include a Negative Mood and Cognitions cluster (*DSM-5*, 2013).

It is important to highlight that the cut-offs found in this study are not intended to be used to screening istrument for PTSD in youth; several measures fulfilling this function already exist (Kenardy, Spence, & Macleod, 2006; Perrin, Meiser-Stedman, & Smith, 2005). Rather, the cut-offs provide clinicians with an idea of what is a clinically significant level of negative appraisals. This may aid clinicians when assessing or formulating children's and adolescents' difficulties, and when monitoring children's progression through therapy. For researchers, the CPTCI-S offers a brief but psychometrically valid questionnaire for measuring negative trauma-related cognitions that may be involved in the maintenance of PTSD (e.g. in large-scale surveys) or may underpin recovery in treatment trials. One research question of particular interest is whether the CPTCI is a useful questionnaire to differentiate

changes during treatments focussed on modifying cognitive aspects versus exposure based treatments for children (Nixon et al., 2012).

There are some study limitations worth noting. Whilst we feel the heterogeneity of our sample pooled from a number of different sites was study strength, this introduced the possibility site differences played a role, especially as a slightly lower optimal cut-off point was found when looking at the Adelaide site individually. There were also issues with generalisability. Measures of PTSD and CPTCI symptoms were taken between 1 and 6 months post development and in victims of one-off trauma only. The use of hospital recruited samples to study responses to trauma is widely established in the child trauma field on the rationale that responses to trauma are hypothesised to occur on a continuum, however it would be helpful to evaluate the psychometric properties of the CPTCI in a clinical population.

In the future, it will be important to replicate the cut-off examination in a more homogenous sample, and a range of other samples including children that have been involved with disaster/war/abuse. It will also be important to investigate whether a similar clinical cut-off is found when comparing CPTCI scores to other psychological disorders (e.g., anxiety, depression). Future studies might investigate the convergent validity of the tool in further detail by exploring the measure's convergence with cognition words/cognitive characteristics in narratives.

To summarise, these findings add to the growing body of literature indicating cognitions are a core feature of PTSD status following traumatic experiences. Our results underscore the importance of routinely assessing for the presence of maladaptive cognitions in the aftermath of a trauma.

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TABLE 1 [KLD1]*[DAM2]*

Item Loadings for the CPTCI – Short Form.

Item	Fragility in scary world	Disturbing change
5. I don't trust people.	.72	
7. I am no good.	.75	
10. I can't cope when things get tough.	.66	
15. Bad things always happen.	.82	
4. Reactions since event mean I have changed for the worse.		.79
6. Reactions since event mean something is seriously wrong.		.81
14. I used to be a happy person but now I am always sad.		.75
16. I will never be able to have normal feelings again.		.82
19. My life has been destroyed by the frightening event.		.79
21. Reactions since the event mean I must be going crazy.		.77

Note. $N = 492$.

TABLE 2

Sensitivity and Specificty of CPTCI for DSM-IV PTSD Status

Cut-off score	Sensitivity (n = 102)	Specificity (n = 390)
≥ 50	.81	.86
≥ 49	.82	.85
≥ 48	.82	.84
≥ 47	.84	.83
≥ 46	.84	.81
≥ 45	.85	.80
≥ 44	.86	.80
≥ 43	.88	.76
≥ 42	.88	.74

Note. PTSD=Posttraumatic Stress Disorder; CPTCI=Children's Posttraumatic Cognitions Inventory; DSM-IV= Diagnostic and Statistical Manual of Mental Disorders - 4th Edition.

TABLE 3

Correspondence of CPTCI-S for DSM-IV PTSD Status

Cut-off	Sensitivity (n = 79)	Specificity (n = 377)
≥ 25	.56	.97
≥ 24	.66	.97
≥ 23	.73	.95
≥ 22	.77	.94
≥ 21	.77	.94
≥ 20	.81	.92
≥ 19	.82	.90
≥ 18	.85	.88
≥ 17	.86	.86
≥ 16	.91	.83

Note. PTSD=Posttraumatic Stress Disorder; CPTCI-S=Children's Posttraumatic Cognitions Inventory – Short form; DSM-IV= Diagnostic and Statistical Manual of Mental Disorders - 4th Edition.